Information Sciences Letters
An International Journal

Utilization of Multimedia Services in Libraries for Students with Disabilities

M. A. Alomari[1], S. A. Daradkah [1], M. O. Abu Al Rub[1], E. M. Alqsaireen [1], and M. A. Khasawneh[2,*]

[1]Department of Special Education, Faculty of Educational Sciences, Ajloun National University, Ajloun, Jordan
[2]Department of Special Education, Faculty of Education, King Khalid University, Abha, Saudi Arabia

Abstract: This study has two primary objectives: first, to determine whether or not students with visual impairments make use of multimedia services, and second, to compile a list of the challenges that handicapped face while attempting to use such services. This research was a descriptive qualitative field study that used a qualitative technique of qualitative description. In addition to interviews and written documentation, observation was another method that was used while compiling this data. The study is significant as it shows the availability of media services in schools' libraries for students with disabilities. According to the findings of this investigation, pupils seem to make effective use of the multimedia services provided by the library for patrons with disabilities. The library offers a variety of services and amenities. Students use of technology, such as laptops and projectors, to get access to material via both visual and audible channels might be seen as evidence that they have achieved this goal. The inadequacy of the service infrastructure and the antiquated nature of the technology makes it difficult to make use of the benefits offered by multimedia services. In addition, there is a severe lack of librarians with experience working with multimedia technology in the world's educational institutions at the present moment.

Keywords: Multimedia, Disability, Utilization, Libraries.

1. Introduction

A service that is either directly connected to information technology or directly related to audio-visual media is referred to as a "multimedia service." The term "multimedia service" is also used to describe a service that combines elements of both of these types of connections and is used to a considerable extent, particularly at inclusion libraries. This service provides a specialized facility for people with special needs, making it easier for those individuals to access different kinds of information. According to Mitra (2006), this is essential because disabilities have both physical and mental limits that differ from those of regular people in general in both their scope and severity. In libraries that are accessible to a wider variety of customers, the infrastructure and technology used to provide consumers with multimedia services are designed and arranged differently than in inclusive libraries. The mission of inclusive libraries is to provide a welcoming space for people of all backgrounds and abilities [1], especially about the services that are made available to customers.

Research conducted on the application of multimedia services for people with disabilities revealed that most libraries do not provide service facilities for people who fall into the category of disabled people [2]. Despite this, the library has also made certain modifications to improve the level of service it provides to customers who, owing to physical constraints, fall under the category of "persons with disabilities." These kinds of accommodations are often located in the specialized service areas of the library [3]. In this particular location, specialized services, in the form of multimedia services, have been developed to cater to the requirements of those who are impaired in some way. One of these services, which is known as a screen reader, is designed to read out loud the content that is shown on a computer screen to those who are blind or have some other kind of visual impairment [4].

1.1. Problem statement

Because libraries are meant to be open to any members of the community, the promotion of inclusive education is something that libraries, which are supposed to be accessible to everyone and everyone, should do. Libraries are a key educational medium. The legislation in Saudi Arabia stipulates that the library must make its collections, facilities, and services accessible to any individuals who are a part of the local community. For this reason, the library should also be

---

*Corresponding author e-mail: mkhasawneh@kku.edu.sa

prepared to provide services to people who have impairments, both in terms of its physical architecture and its holdings, as well as its human resources. Therefore, this study was an attempt to investigate the nature of using multimedia services in school libraries in Abha City, Saudi Arabia.

Questions of the study

The study attempted to answer the following questions:

1- Do students with visual impairments receive multimedia services in their schools' libraries?

2- What are the challenges that students face while attempting to use multimedia services?

Significance of the study

This study focuses on the use of multimedia services in schools' libraries for students with disabilities. Most education institutions focus on the classroom and the resource rooms to provide services for this category of students. This study shifts the focus of educators to the importance of the library as a main platform for students in their learning journey. The results of this study will benefit educators, teachers, and school administrations to pay attention to the nature of multimedia services their libraries provide to students with disabilities.

2. Literature review

Everyone in society will have unlimited access to the information that they need after adaptive multimedia services that are designed specifically for people with disabilities are put into place. Given the circumstances, the library does not show favoritism toward any of its patrons; this includes patrons who are unable to use the library due to physical constraints; this is because the library does not merely carry out responsibilities related to one side of the dispute. This indicates that the library does not show favoritism toward any of the individuals who use its services. If a person has a limited ability to assist in the educational process, they can discover that the provision of this service is of considerable use to them. This ensures that the individual will maintain a level of proficiency commensurate with the ever-quickening pace of technological advancement. Laws et al (2010) stated that this preparation should include having staff members who are trained to work with people who have disabilities. Specifically, the library should have employees who are trained to deal with individuals who have a range of impairments so that everyone can enjoy using the space (librarians) [5].

The main advantage of electronic information resources is that anyone can access anything from anywhere at any time. There is no doubt that computer and Internet use already have a noticeable impact on people with disabilities. This brings us to the topic of accessibility. Given the proliferation of information systems (including the Internet) in our daily lives, the need to address accessibility issues has become increasingly urgent. The use of technology to obtain information about banking, leisure, government, education, and shopping services is becoming increasingly encouraged and expected [6].

The social model is based on physical and attitudinal barriers in society, such as prejudice, lack of coordination, and systematic segregation and exclusion, rather than because of conditions that fall under disability, health, or other medical problems. It assumes that people are disabled. disabled [7]. Disability is, therefore, a social structure created by barriers such as structure (organizational and institutional norms, ideologies, policies, etc.); and use of the environment (e.g., lack of elevators and ramps, resources for people with disabilities (e.g., assistive technologies and devices, alternative forms of information, etc.) not). These barriers prevent people with disabilities from participating fully in society, accessing employment opportunities, and living independently.

Shanimon and Rateesh [8] argued that disability is the result of society's failure to seek adequate services from persons with disabilities and to adequately ensure that the needs of persons with disabilities are addressed in social organizations. doing. Against this background, the social model aims to remove these unnecessary barriers [9], so that society has access to accessible buildings, accessible communication, accessible services, accessible information, etc. [10]. According to Korat [11], social models have not only played a central role in shaping the landscape of disability research but have also informed collective behavior within the disability community. Levitt [12] argues that the social model can be viewed as a valuable empirical perspective that has fundamentally contributed to changes in society's understanding of disability and how people with disabilities are addressed. Moreover, the social model is fundamental in transforming the lives of people with disabilities, as organizations have made reasonable adjustments to disability to remove many barriers to social inclusion [13].

The overwhelming majority of the already operational special schools have already adopted and are making extensive use of this service. This is the case even though a significant number of students have expressed a desire for current information to increase the breadth of their understanding [14]. We are unable to speculate on the nature of the problem. As a direct result of this, it is essential to carry out a comprehensive study about the issue that this results in.

Kiruki and Mutula [15] examined the accessibility and usability of library websites for students with visual and physical disabilities at public universities in Kenya. Data were collected using questionnaires, focus group discussions, structured interviews, and observations. The study population consisted of six public universities with a long history of enrolling students with disabilities. The census included students with visual impairments (86), students with physical disabilities (91), university librarians (6), disability mainstream staff (6), and system librarians (6), and was used to obtain a research sample consisting of libraries. Staff providing information services to students with disabilities (133). The Social Model of Disability and the IFLA Checklist for Libraries Access for Persons with Disabilities were used as the conceptual and theoretical framework for the study. The survey results showed that all libraries have a library website. However, the website did not include a disability services page or information specific to people with disabilities. The study concluded that people with disabilities are prohibited from accessing and using public university library websites. The author recommended that her website for the library include a disability services page that provides information specific to people with disabilities.

3. Methodology

The qualitative approach was used as the methodology of this research. The qualitative approach is characterized as being qualitatively descriptive. The data sources that were obtained directly via direct interviews with the persons who were the topic of the research will serve as the foundation for the discussion. The sample included 60 students with disabilities from four different schools in Abha City in Saudi Arabia.

The great majority of the information was gleaned via the use of handwritten notes, video recorders, audio recorders, and tape recorders. This investigation made use of many different kinds of data, including primary data obtained through oral or interview-based methods and secondary data collected from existing data sources, such as data that had been previously archived. Both primary and secondary data were utilized in this investigation. Interview-based methods were used throughout the majority of the data collection process. To gather information for this study, the researchers used a wide range of methods, one of which was research carried out in the field. To provide a further level of specificity, the researchers fulfilled their information requirements by doing a field study.

4. Results and Discussion

Utilization of Multimedia Services for Persons with Disabilities

Researchers are in a position to draw the inference, based on the findings of interviews with informants, that the Special School Library already provides services in the field of multimedia technology. These interviews were conducted to gather information about the Special School Library's operations. This is because the researchers posed their questions to individuals who were already familiar with the situation. As a result, this result was achieved. This is made evident by the fact that the library is equipped with a lot of technologically modern equipment and infrastructure. Specifically, this is the case since the library has a digital reading room. This comprises PCs and LCD projectors that are readily available for use by anybody who comes to the institution. This demonstrates without any reasonable doubt that the library places a significant emphasis on technical progress. Aabø & Audunson [16] and Connell [17] stated that this service has in the past been used by patrons of the school library, who have included students as well as other persons who make use of the library. According to Green & Peloza [18] People who make use of the library are considered to be customers of the institution. As a direct consequence of the provision of this service, there has been an appreciable rise in the number of patrons who make use of the library's collection of books and other resources.

Because of the information that was supplied by the informant, the researcher was able to draw the following conclusion as a consequence of their investigation: The Special School Library offered multimedia services in addition to acting as a resource for finding new paths of knowledge and making an attempt to stay up with the most current developments in the world. In other words, the library was a comprehensive information center. These services were always kept separate from one another and never communicated with one another. This was done to prove to everyone, and especially students, that knowledge can be obtained not only by reading books but also via the use of services that are based on information technology. This was the primary motivation behind why this was done. It was hoped that the pupils' creative spirits would be stimulated in some manner as a result of this [19].

Because of the results that were obtained from speaking with the various sources of information, the researcher is in a position to reach the following inference as a result of the inquiry that he or she conducted as a consequence of their findings: The library was able to accomplish the goal that it set out to achieve because it took the necessary precautions to ensure that the multimedia services it offers are used in a manner that is appropriate for the organization [20]. The results of the interviews that were performed with the most relevant informants led to the discovery that the library that is situated within the school already offers multimedia services. This was found as a result of the discovery that the most

pertinent informants were interviewed. These conclusions were derived from the results of the interviews that were conducted. This was the only conclusion that made sense in light of the facts that were found during the investigation.

Because this service is provided, the researcher can conclude that the multimedia services that are offered in the library are functioning properly and are being utilized by users to locate information and access other services that they desire. In addition, the researcher can conclude that these services are being utilized by users. In addition to this, the researcher is in a position to arrive at this conclusion because the library does provide this service. This is because the researcher has seen an increase in the amount of interest shown by visitors to the library as a result of their increased frequency of trips there. After going back and reading the findings of the previous interview that was performed with one of the instructors, it is possible to get this conclusion. This is because it is conceivable to come to this conclusion. However, the work that goes into all of that is done by a teacher, who not only educates the students but also shows them how to utilize the multimedia materials that are housed in the library of the school [21, 22]. All of that work is done by a teacher.

Educators have voiced their opinion that the use of these services has increased significantly after they included multimedia content. This is because multimedia services are a useful tool that has the potential to increase student's interest while they are learning, and this is especially true for students who have impairments. This is particularly important to keep in mind for pupils who are deaf or hard of hearing. This is something that rings particularly true when it comes to the issue of children who have various kinds of impairments. The presentation of animation, which is a component of this multimedia service, maybe a method that can be used to stimulate the child's intellect in those who are handicapped and whose psychomotor abilities are sluggish. This could be a method that can be used by those who are in a wheelchair or who have other physical limitations. Those who are seeking a means to assist children who have special needs can find this approach to be useful in their search for a solution.

4.1. Constraints in the Utilization of multimedia services

In recent years, a variety of multimedia services have been accessible at a selection of libraries, the most renowned of which is the library that is the subject of this discussion. The insufficient availability of facilities and infrastructure for users, as well as librarians' continued lack of understanding about technological services, are the primary impediments to the use of multimedia services. Another barrier is the lack of understanding among librarians regarding technological services [23, 24]. Another obstacle is that librarians do not have sufficient awareness of the available services. The researcher will discuss some of the responses based on the findings of the interviews that have been carried out by asking several questions to the informants about what difficulties are experienced in the utilization of the multimedia services that are carried out in the library. These interviews were conducted by asking several questions to the informants about what difficulties are experienced in the utilization of multimedia services. The results of the interviews that were conducted will serve as the foundation for these findings. With this as a supporting piece of evidence, the researcher will have the ability to get further information on the situation.

Based on the findings of the interviews, the researchers concluded that the inability to use the multimedia services offered by the library was hampered by the absence of multimedia service device facilities that catered to every condition experienced by persons with disabilities. This conclusion was reached after concluding that the inability to use the multimedia services offered by the library was a result of the findings of the interviews. The researchers were unable to make use of the multimedia facilities offered by the library, which contributed to the formation of this conclusion. Aside from that, the budget funds that are available at Special Schools are not capable of thoroughly fixing devices that are based on multimedia, and the librarians who are expected to be able to run devices that are based on multimedia have not mastered these devices. Moreover, the budget funds that are available at Special Schools are not capable of thoroughly fixing devices that are based on multimedia. In addition, the budgetary resources that are offered at Special Schools are insufficient to allow for the comprehensive repair of equipment that is dependent on multimedia. In addition, the financial resources that are provided at Special Schools are inadequate to enable the maintenance of electronic devices that are reliant on multimedia. This is one of the issues that students face [25].

The researchers drew the conclusion based on the findings of the interviews that barriers to using multimedia services were not only caused by a lack of facilities and school budgets but that these barriers could also come from students because people with disabilities have different deficiencies. This conclusion was reached as a result of the fact that the researchers concluded that a lack of facilities and school budgets were not the only causes of these barriers. This conclusion was <u>reached</u> as a result of the fact that the researchers came to the opinion that a lack of facilities and school finances were not the main reasons for these obstacles. Specifically, this conclusion was made as a consequence of the fact that this conclusion was reached. This conclusion was reached as a direct result of the results that were obtained from the interviews that were carried out. People with disabilities cannot be coerced into using multimedia services because their mental and physical limitations prevent them from doing so. This is because these services are inaccessible to them. The study concluded that this is not possible, which was one of its conclusions. The research also led to the conclusion that this cannot be done.

The word "multimedia" refers to a category of services that contains many various kinds of media, including but not limited to books, newspapers, movies, and videotapes. The term "multimedia" may also be used to refer to the category of services that encompass all of these distinct kinds of media. The opportunity to study alone, without the direction of a teacher, is thus made available to the students. If there is a stronger interest in reading as a result of the availability of this collection, which may boost reading interest, then students will have a better capacity to comprehend reading techniques. If there is a stronger interest in reading as a result of the availability of this collection, which may boost reading interest. Students will be able to read with greater comprehension as a result of this. Students at this school can study and acquire essential skills in the process of transferring information and ideas thanks to the whole facility which is the school library. This includes its infrastructure as well as the collections that it manages and maintains. This is made possible as a result of the enormous collection of books and other materials that is managed by the school library. To ensure that the children would, in the years to come, have the opportunity to go through the process of personal growth. The availability of chances for education is the most effective approach for elevating the overall quality of people's lives and, as a result, contributing to the general progression of society. As a consequence of this, the library has the potential to evolve into a resource for education, which may aid in the creation of instructional programs that are implemented inside schools.

The term "assistive technology" refers to the use of information technology to make library services more accessible to those who have impairments. One example of this kind of technology is the electronic book reader [26]. The word "assistive technology" refers to a variety of items, devices, and pieces of equipment that are used to treat, enhance, or otherwise improve the capabilities of individuals who have impairments in some other manner [11]. Customers of the library who have physical restrictions now have a greater chance of having an easier time accessing the information and services that the library provides as a result of the wide variety of assistive technologies that are already on the market.

The information and communication technology that is used in the library can be put to a variety of different purposes, each of which is determined by the function that the technology performs while it is housed inside the library [27]. These purposes can include everything from research to entertainment and everything in between. Wu et al [28] argued that the utilization of information and communication technology in libraries for the purposes for which it was developed has developed into an unavoidable requirement that can no longer be put off. Pipek & Wulf [29] stated that this is because the adoption of information technology for it to perform its tasks and the utilization of information and communication technology for the reasons for which it was designed in libraries has evolved into an unavoidable need. Users have access to a wide range of information and communication technology applications, all of which are geared up and prepared to be utilized to the fullest extent of their capabilities to achieve the goals of the library. In the real world, information and communication technology in the library will eventually serve as a repository for knowledge, as learning aids, as library facilities, as competence standards, as administrative assistance, as instruments for library administration, and as the infrastructure of the library itself. All of these functions will eventually take place in the library.

5. Conclusion

This study was an attempt to investigate the nature of using multimedia services in school libraries in Abha City, Saudi Arabia. Students have made effective use of the many multimedia options that the library makes available to customers who are coping with some kind of handicap. This can be demonstrated by the student's utilization of the facilities and infrastructure that have been made available to them. For example, students have made use of the computers and projectors that have been made available to them to gain access to information through audio-visual media. The fact that the instructors make use of the resources and infrastructure that have been given is another way this may be shown. In addition to this, there has been the formation of supporting services with the purpose of the development of children's cognitive and psychomotor skills. The broad adoption of multimedia services is, however, inhibited by several issues, the most significant of which is the very limited capabilities and infrastructure that are now available. This is because the number of people who normally visit the library does not even come close to matching the number of computers that are maintained by the library. The reason for this is because the library maintains a large number of computers. This is because the library has so many different kinds of computers. A fundamental shortcoming of the library is that it does not presently have any employees that are proficient in the use of technology that is based on the use of multimedia, which is a restriction. The fact that librarians who are well-versed in their respective professions are often absent from the libraries that offer multimedia services presents yet another challenge for the sorts of facilities that house these kinds of resources.

6. Ethical considerations

The researcher made sure to take all permissions and provided clear disclaimers before asking participants to be part of this study. The participants were made sure that their answers and comments will remain anonymous throughout the study.

7. Acknowledgments

8. Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

References

[1] Adeyoyin, S. O. (2005). Strategic planning for marketing library services. *Library management*, *26*(8/9), 494-507. https://doi.org/10.1108/01435120510631783.

[2] Lance, K. C., & Kachel, D. E. (2018). Why school librarians matter: What years of research tell us. *Phi Delta Kappan*, *99*(7), 15-20.

[3] Gretes, F. (2013). School library impact studies: A review of findings and guide to sources. *Owings Mills, MD: Harry & Jeanette Weinberg Foundation*.

[4] Ayasrah, M. N., Alkhawaldeh, M. A., Khasawneh, M. A. S., & Alnajjar, F. Y. A. (2022). The Role of Teacher Interpersonal Communication with Autistic Students in Developing Social Skills. *Clinical Schizophrenia & Related Psychoses*. DOI: 10.3371/CSRP.MMWY.100127

[5] Alatoom, E. K. T., & Khasawneh, M. A. S. (2022). The Reality of Online Education and its Obstacles from the Perspectives of Resources Rooms Teachers in Amman Schools During the COVID-19 Pandemic. *Journal of Positive Psychology and Wellbeing*, *6*(1), 3195-3205. https://journalppw.com/index.php/jppw/article/view/5192

[6] Khasawneh, M. (2022). The Relationship of Curriculum, Teaching Methods, Assessment Methods, and School and Home Environment with Learning Difficulties in the English Language from the Studetns' Perspectives. *Journal of Innovation in Educational and Cultural Research*, *3*(1), 41-48. https://doi.org/10.46843/jiecr.v3i1.51

[7] Carson, G. (2009). The Social Model of Disability. Scotland: Scottish Accessible Information Forum. http://www.saifscotland.org.uk/wp-content/uploads/2014/04/social-model-of-disability.pdf

[8] Shanimon, S., & Rateesh, K. N. (2014). Theoretizing the Models of Disability Philosophical Social and Medical Concepts- An Empirical Research Based on Existing Literature. International Journal of Scientific and Research Publications, 4(6), 1–7.

[9] Ghosal, A., & Chandra, A. (2019). The Social Model: Disability as a socially constructed Phenomenon, International Journal of Engineering Development and Research, 7(2), 381–384. https://www.ijedr.org/papers/IJEDR1902071.pdf

[10] National Commission Persons with Disability. (2007). Rights, not Charity: Guidelines towards an Inclusive Society and a Positive Difference in the Lives of Maltese and Gozitan Disabled People. http://crpd.org.mt/wp-content/uploads/2016/07/Dritijiet-mhux-karita-EN.pdf

[11] Korat, O., & Or, T. (2010). How new technology influences parent—child interaction: The case of e-book reading. *First Language*, *30*(2), 139-154. https://doi.org/10.1177/0142723709359242.

[12] Levitt, J. M. (2017). Exploring how the Social Model of Disability can be Re-invigorated: in Response to Mike Oliver. Disability and Society, 32(4), 589–594. https://doi.org/10.1080/09687599.2017.1300390

[13] Aburezeq, I. M., Dweikat, F. F., Al-Shaar, A. S., & Khasawneh, M. A. S. (2022). Case Study on the Dissemination of Radicalism on social media. *Information Sciences Letters,* *11(6)*, pp. 2339–2343. DOI: http://dx.doi.org/10.18576/isl/110640

[14] Khasawneh, M. A. S. (2022). Language Skills and Their Relationship to Learning Difficulties in the English Language from the Teachers' Point of View. *The Journal of Quality in Education*, *12*(19), 104-113. https://doi.org/10.37870/joqie.v12i19.308

[15] Kiruki, B. W., & Mutula, S. M. (2021). Accessibility and usability of library websites to students with visual and physical disabilities in public universities in Kenya. *International Journal of Knowledge Content Development & Technology*, *11*(2), 55-75.

[16] Aabø, S., & Audunson, R. (2012). Use of library space and the library as a place. *Library & information science*

research, *34*(2), 138-149. https://doi.org/10.1016/j.lisr.2011.06.002.

[17] Connell, R. S. (2009). Academic libraries, Facebook and MySpace, and student outreach: A survey of student opinion. *portal: Libraries and the Academy*, *9*(1), 25-36. 10.1353/pla.0.0036.

[18] Green, T., & Peloza, J. (2014). How do consumers infer corporate social responsibility? The role of organization size. *Journal of Consumer Behaviour*, *13*(4), 282-293. https://doi.org/10.1002/cb.1466.

[19] Chin, C., & Osborne, J. (2008). Students' questions: a potential resource for teaching and learning science. *Studies in science education*, *44*(1), 1-39. https://doi.org/10.1080/03057260701828101.

[20] Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: systematic review and recommendations. *The Milbank Quarterly*, *82*(4), 581-629. https://doi.org/10.1111/j.0887-378X.2004.00325.x.

[21] Krstev, C., & Trtovac, A. (2014). Teaching multimedia documents to LIS students. *The Journal of Academic Librarianship*, *40*(2), 152-162. https://doi.org/10.1016/j.acalib.2014.02.006.

[22] Asan, A. (2003). School experience course with multimedia in teacher education. *Journal of computer-assisted learning*, *19*(1), 21-34. https://doi.org/10.1046/j.0266-4909.2002.02602.x.

[23] LaPolla, F. (2013). Perceptions of librarians regarding Semantic Web and Linked Data technologies. *Journal of Library Metadata*, *13*(2-3), 114-140. https://doi.org/10.1080/19386389.2013.826063.

[24] Boissonnas, C., & Boissonnas, C. (2001). Technical services: The other reader service. *portal: Libraries and the Academy*, *1*(1), 33-46. 10.1353/pla.2001.0001.

[25] Larson, L. C. (2012). It's time to turn the digital page: Preservice teachers explore e-book reading. *Journal of Adolescent & Adult Literacy*, *56*(4), 280-290. https://doi.org/10.1002/JAAL.00141.

[26] Laws, J., Parish, S. L., Schmitt, A. M., & Egan, C. (2010). Preparation of social workers to support people with developmental disabilities. *Journal of Teaching in Social Work*, *30*(3), 317-333. https://doi.org/10.1080/08841233.2010.497128.

[27] Malhotra, A., & Majchrzak, A. (2014). Enhancing the performance of geographically distributed teams through targeted use of information and communication technologies. *Human Relations*, *67*(4), 389-411. https://doi.org/10.1177/00187267134952.

[28] Wu, J., Guo, S., Huang, H., Liu, W., & Xiang, Y. (2018). Information and communications technologies for sustainable development goals: state-of-the-art, needs, and perspectives. *IEEE Communications Surveys & Tutorials*, *20*(3), 2389-2406. 10.1109/COMST.2018.2812301.

[29] Pipek, V., & Wulf, V. (2009). Infrastructuring: Toward an integrated perspective on the design and use of information technology. *Journal of the Association for Information Systems*, *10*(5), 1. 10.17705/1jais.00195.